



May - June - 2011

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**T.E. (Computer) (Semester - I) Examination, 2011**  
**DIGITAL SIGNAL PROCESSING (New)**  
**(2008 Pattern)**

Time : 3 Hours

Max. Marks : 100

- Instructions:** 1) Answers to the two Sections should be written in separate books.  
2) Neat diagrams must be drawn wherever necessary.  
3) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.  
4) Assume suitable data, if necessary.  
5) Attempt Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section-I and Q. 7 or Q. 8, Q. 9, or Q. 10, and Q. 11 or Q. 12 from Section-II.

**SECTION - I**

1. A) Sketch and define two standard DT signals  $\delta(n)$  and  $u(n)$ . Using convolution

show that  $u(n) = \sum_{K=0}^{\infty} \delta(n - K)$ . 8

- B) With example explain following properties of DT system

- i) Stability ii) Linearity. 8

OR

2. A) Obtain a linear convolution of DT signals

$$x(n) = \{1, 0, -2, 1\}$$

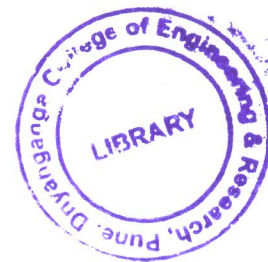
$$h(n) = \{-1, 2, -1, 1\}$$

by using convolution formula. 8

- B) State the following terms w.r.t. sampling process :

- i) Aliasing ii) Sampling rate  
iii) Quantization iv) Coding. 8

P.T.O.





3. A) Define a Fourier Transform (FT). State any 4 properties of FT. What is the significance of magnitude response? 8

B) State the relationship between FT and DFT. Obtain 5 point DFT for  $x(n) = \{1, 2, 3, 4\}$ . 8

OR

4. A) State any 4 properties of DFT. How frequency response of N pt DFT is obtained and represented? 8

B) Compute 4 point circular convolution using DFT and IDFT for  $x(n) = h(n) = \{1, 1, 1, 1\}$ . 8

5. A) Draw a basic butterfly structure for DIT and DIF FFT algorithm. Obtain the computational complexity and compare it with direct computation of N pt DFT. 10

B) Using ZT properties, obtain ZT of a sequence -  $x(n) = 2^n u(n - 2)$ . Sketch the ROC. 8

OR

6. A) Derive the relationship between ZT and DFT. Explain the significance of ROC and state the properties of ROC. 10

B) Obtain IZT using PFE method where  $X(z) = \frac{z^3}{(z+1)(z-1)^2}$ . 8

### SECTION – II

7. A) Define and obtain a system function  $H(z)$  from an  $N^{\text{th}}$  order general difference equation. Express it for  
i) all zero system    ii) all pole system    iii) pole zero system. 10

B) Determine an impulse response of a system described as  $y(n) = x(n) + 0.6 y(n - 1) - 0.08 y(n - 2)$ . 8

OR

